



NAPPO Regional Standards for Phytosanitary Measures (RSPM)

RSPM No. 31 Guidelines for Conducting Pathway Risk Analysis

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June 10, 2008

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Review

NAPPO Regional Standards for Phytosanitary Measures are subject to periodic review and amendment. The next review date for this NAPPO standard is 2013. A review of any NAPPO Standard may be initiated at any time upon the request of a NAPPO member country.

Approval

This Standard was approved by the North American Plant Protection Organization (NAPPO) Executive Committee on and is effective immediately.

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Implementation

See the attached Implementation Plan.

Amendment Record

Amendments to this Standard will be dated and filed with the NAPPO Secretariat. The most recent version will be posted on the NAPPO website at:
www.nappo.org/stds_e.htm

Distribution

This Standard is distributed by the Secretariat of the NAPPO within NAPPO, including Sustaining Associate Members and Industry Advisory Groups, to the FAO International Plant Protection Convention (IPPC) Secretariat and to the Administrative Heads of other Regional Plant Protection Organizations (RPPOs).

Introduction

Scope

This standard provides guidance for the preparation of a pathway risk analysis (PWRA) document. PWRA may be used to determine if individual pathways have the potential to allow the entry or spread of pests and to rank and prioritize multiple pathways according to their relative level of risk. Accordingly, PWRA may be used as a decision tool to assign limited resources most effectively to those pathways that pose the greatest risk and for which management options are also feasible and cost-effective. PWRA addresses multiple pathway scenarios only; single pathway scenarios are addressed in ISPM No. 11, *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms* (section 1.1.1). This standard pertains to unintentional introductions of plant pests entering North America or spreading into new areas within North America, by a variety of human-mediated pathways. It does not address intentional introductions or introductions by natural pathways such as wind, water or animal migrations. As such, the standard follows the definition of a pathway from ISPM No.5, i.e. *any means that allows the entry or spread of a pest*, with the exception of natural means.

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National Invasive Species Council, United States. 2007. Training and Implementation Guide for Pathway Definition, Risk Analysis and Risk Prioritization. 56 pp. Unpublished.

NAPPO RSPM No. 23 (2004) *Guidelines for Consignments in Transit*, NAPPO

NAPPO RSPM No. 24 (2005) *Integrated Pest Risk Management Measures for the Importation of Plants for Planting into NAPPO Member countries*, NAPPO

United States Food and Drug Administration. Hazard analysis and critical control point principles and application guidelines. Online [www.cfscan.fda.gov].

Definitions, Abbreviations and Acronyms

Critical control point	A step in a pathway system where specific procedures can be applied to achieve a defined effect and can be measured, monitored, controlled and corrected.
Pathway categorization	The process for determining whether a pathway can allow the entry or spread of one or more potentially regulated pests (New)
Pathway mapping	The identification and description of pathway characteristics relevant to pest entry or spread, considering the entire pathway route from origin(s) to end point(s) (New)
Pathway prioritization	The process of listing pathways in order from high priority to low priority based on pathway ranking, as well as risk modifiers (externalities) which were not part of the risk assessment but that play a role in deciding which risk management option(s) to select and use. Used as a decision aid by NPPOs to determine where plant health resources should be focused (New).
Pathway ranking	Assigning risk levels to pathways based on results of pathway grouping and pathway risk assessment (New)
Pathway risk analysis	The process of evaluating multiple pathways and their associated pests based on biological and other scientific and economic factors to determine which pathways have the highest priority for management, and the kind and strength of phytosanitary measures to be taken against them relative to other pathways (New)

Pathway risk assessment	The process of evaluating multiple pathways and the pests associated with those pathways, and the ranking of those pathways based on their level of phytosanitary risk (New)
Pathway risk management	The evaluation of options to reduce the risk of entry and spread of pests associated with pathways, and the selection of options based on pathway prioritization (New)
PWRA	Pathway Risk Analysis (New)
PWRA area	Areas within the importing country in relation to which a Pathway Risk Analysis is conducted

Outline of Requirements

The objectives of a Pathway Risk Analysis (PWRA) are to identify human-mediated pathways of quarantine concern, assess and rank the risk associated with them, and identify and prioritize risk management options.

PWRA follows a process defined by three stages (see Appendix 1):

Stage 1 *Initiating the process* involves identifying pathways that are of concern and should be considered for pathway risk analysis; and, grouping the pathways according to their similarities (Appendix 1).

Stage 2 *Pathway risk assessment* begins with the categorization of individual pathways to determine whether they present a phytosanitary risk. If a pathway presents a phytosanitary risk, risk assessment continues with an evaluation of each pathway and, if necessary, of pests associated with each pathway according to ISPM No. 11. Risk and uncertainty are taken into account at various steps within the assessment and when combined, provide the cumulative score for each pathway. Current phytosanitary risk management practices are taken into account during the process. These evaluations are then used to rank all pathways under consideration.

Stage 3 *Pathway risk management* involves identifying management options for reducing the risks identified at **Stage 2**. Pathways are then prioritized based on a combination of the rank assigned in **Stage 2** and risk modifiers or externalities (i.e., feasibility, availability of resources, cost-effectiveness, impact, executive priority, political factors, trading partner consultations and other sensitive issues). Finally, management options are selected and applied to address the phytosanitary risk posed by the pathway(s) with the higher priorities.

In **Stages 2 and 3**, risk and uncertainty are scored multiple times with respect to pathways and pests. The steps involved in scoring are subordinate to the main processes of pathway ranking and pathway prioritization.

Background

The objective of this standard is to provide guidance on conducting Pathway Risk Analysis (PWRA) to identify, assess, rank and prioritize pathways in order to inform the decision making processes of National Plant Protection Organizations (NPPOs) for the application of phytosanitary measures. This standard complements international standards for Pest Risk Analysis (PRA) (ISPM No. 2, *Framework for pest risk analysis* and No. 11, *Pest risk analysis for quarantine pests including analysis of environmental risks and living modified organisms* by focusing on the risk associated with pathways rather than the risk associated with pests in those pathways. At present, neither the IPPC nor NAPPO has a definition or a standard for analyzing the risk associated with particular pathways that goes beyond conducting a series of PRAs for individual pathways and associated pests associated with them. This standard provides guidance for ranking and prioritizing, in a systematic manner, the risk associated with particular pathways, based on characteristics of the pathways themselves in addition to the risks presented by the pests they may carry. It may be used to rank and prioritize multiple pathways associated with a single pest or multiple pathways associated with multiple pests. The risk management stage focuses on the pathway rather than the pest(s) and opportunities to mitigate pest entry or spread at critical control points along the pathway. The present standard incorporates parts of ISPM No. 11 with three stages: Initiation, Risk Assessment, and Risk Management.

Pest risk analysis and pathway risk analysis are intrinsically linked. One can not be effectively applied without consideration of the other. The difference between PRA and PWRA lies in the primary focus of the PWRA. A PRA focuses on the risk associated with individual pests that may be transported via the pathway, while a PWRA focuses on the risk associated with the pathway itself, and the risk relative to other pathways. Procedures unique to PWRA are the mapping, ranking and prioritization of multiple pathways.

Pathways are defined as the means by which pests are allowed to enter or spread in an area (ISPM No. 5, *Glossary of Phytosanitary Terms*). Primary pathways for the introduction of plant pests may include imported consignments of plants and plant products but this is pest-dependent. However, it is also important to consider the risk of introducing those same pests with other types of pathways (e.g. packing material, mail, garbage, passenger baggage, etc.) which are mentioned in ISPM No. 11 (section 1.1.1). In order to better understand how pests may enter or spread into their territory, NPPOs may benefit from consulting examples of detailed pathway classification systems based on types of pathways such as transportation and living industries (Appendix 1). Each pathway has a specific set of elements that will have an impact on the pests that may be associated with it. Pathways can be relatively simple or extremely complex depending on the variety of means of entry or spread and the means by which different commodities move around the globe. From a risk management point of view, the number of critical control points will also affect the pests associated with the pathway. If a pathway is visualized as a flow diagram with a beginning, end, and various points in the middle, critical control points are those steps along the pathway where effective risk management measures may be applied as pointed out in ISPM No. 14, *The Use of Integrated Measures in a Systems Approach for Pest Risk Management*. The above-

mentioned flow diagram is defined in these guidelines as pathway mapping. For multiple pathways for a pest of concern, or for multiple pathways and multiple pests, it is crucial to identify the elements and critical control points of each pathway if the pathways are to be ranked, prioritized, and risk management measures applied most effectively.

Pathway risk is a product of two risk factors: exposure of commodity and pest complex risk level. The first is the level of exposure of the commodity or other entity (e.g., cargo vessel, container, train car, packaging) to the environment in the PWRA area at the end of the pathway which will facilitate entry or spread of pests into that area. This level of exposure will depend on degree of processing, intended use, complexity of makeup, etc. The second factor is the risk level of the pest complex that arrives at the end of the pathway into the PWRA area with the commodity or other entity.ⁱ The risk level of the pest complex is based on the cumulative level of risk of each pest. The level of risk of each pest is based on likelihood and consequences of introduction.

ISPM No. 15, *Guidelines for Regulating Wood Packaging in International Trade*, NAPPO RSPM No. 23, *Guidelines for consignments in transit* and ISPM No. 25, *Consignments in transit* are examples of standards that are based on PWRA. ISPM No. 15 approaches PWRA from the perspective of a particular commodity that may act as a pathway for known and unknown quarantine pests. Phytosanitary measures applied are not pest specific but rather are focused on mitigating risk associated with the pathway. NAPPO RSPM No. 23 addresses the risks associated with regulated articles passing through a country on their way to the country of destination. NAPPO RSPM No. 23 focuses primarily on the mode of transport, with the commodity in transit and/or individual pests considered secondary elements.

In today's global marketplace, the traditional approach to addressing phytosanitary risk, by assessing individual pests associated with intentional importations, is not sufficient to effectively mitigate unintentional pest introductions, as is pointed out in NAPPO RSPM No. 24, *Integrated Pest Risk Management Measures for the Importation of Plants for Planting into NAPPO Member countries*. An increasing focus on the protection of natural areas from plant pests also contributes to this challenge, as it presents difficulties associated with pest surveillance and the application of phytosanitary procedures to large areas with potentially diverse landscapes and remote locations. Preventing the introduction of pests by addressing critical control points along human mediated pathways, ranked according to their relative risk of transporting pests, will guide NPPO decisions in the use of their plant protection resources to protect both natural and managed environments. Pathway risk analysis will provide insights into phytosanitary control points along pathways, opportunities and challenges for risk mitigation, and gaps in knowledge.

Pathway Risk Analysis Requirements (Follow flowchart in Annex 1)

1. PWRA Initiation

The aim of the initiation stage is to identify and group the pathways which are of quarantine concern and should be considered for risk analysis in relation to plant pests.

1.1 Identification of Initiation Points

The PWRA process may be initiated as a result of:

- 1) the identification of multiple pathways that present potential pest hazards
- 2) the identification of a pest associated with multiple pathways that may require phytosanitary measures
- 3) the review or revision of phytosanitary policies and priorities
- 4) the request to allow import of a new commodity, or a commodity from a new origin

It should be specified whether the PWRA is to be conducted with respect to a single known pest, multiple known pests, or to a range of potential pests that may be associated with each pathway.

1.2 Identification and Grouping of Pathways

The pathways of interest for analysis are listed and described briefly. The kinds of pathways may be grouped according to their common aspects such as modes of transportation (i.e., air, water, land) and further broken down into sub-pathways based on other factors such as purpose, commodity, conveyance, etc. An example of grouping pathways in this manner is provided in Appendix 1. ⁱⁱ

1.3 Identification of PWRA area

The PWRA area should be defined as precisely as possible. This is analogous to the PRA area of ISPM No. 11.

1.4 Information Gathering

Information gathering is an essential element of all stages of PWRA. Information for a PWRA may come from a variety of sources. The provision of official information regarding pest status is an obligation under the IPPC (Art. VIII.1c); facilitated by official contact points (Art. VIII.2). As for environmental risks, the variety of sources of information will generally be wider than traditionally used by NPPOs. Broader inputs may be required. These sources may include environmental impact assessments.

A check should also be made as to whether PWRA(s) have already been done for the pathway(s) or some part(s) thereof. Because pathways and the pests they carry can cross international borders, PWRAs done by other NPPOs may be relevant to parts of a pathway being analyzed. If a PWRA exists, its validity should be checked as circumstances and information may change. The possibility of using a PWRA from a similar pathway, that may partly or entirely replace the need for a new PWRA, should also be investigated.

- PWRA can be accomplished by a single expert or a team of experts. For more complex pathways, a team of experts may be necessary for an adequate analysis.¹

1.5 Conclusion of initiation

At the end of **Stage 1**, the initiation point, the pathways of concern and the PWRA area have been identified. Relevant information has been collected and pathways have been identified as possible candidates for risk analysis. A team of experts has been developed to analyze the various pathways of concern.

2. Pathway Risk Assessment

Risk assessment is conducted for each pathway. The process for pathway risk assessment can be broadly divided into four interrelated steps:

- pathway categorization
- assessment of the pathways
- assessment of pest(s) associated with the pathways (as per ISPM No. 11)
- pathway ranking

In most cases, these steps will be applied sequentially in a pathway risk assessment but it is not essential to follow a particular sequence. In some cases, it may not be necessary to go through all steps. For example, for the single pest/multiple pathways scenario, for which only sections 2.1, 2.3 and 2.4 need be completed. However, for multiple pest/multiple pathways scenarios, all sections should be completed.

Pathway risk assessments need to be only as complex as is technically justified by the circumstances. This standard allows a specific PWRA to be judged against the principles of necessity, minimal impact, transparency, equivalence, risk analysis, managed risk and non-discrimination set out in ISPM No. 1, *Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade* (FAO, 2006).

2.1 Pathway Categorization

A pathway is defined as any means that allows the entry and spread of a pest (ISPM 5). If the criteria of the pathway definition are not met then a pathway risk assessment is not required. The opportunity to eliminate a pathway or pathways from consideration before in-depth examination is undertaken is a valuable characteristic of the categorization process.

¹ Based on NISC (2005)
RSPM No. 31
Guidelines for Conducting Pathway Risk Analysis

2.1.1 Elements of Categorization

The categorization of a pathway as a means to allow entry and spread of a pest should take into account:

- a description of the pathway (pathway mapping)
- an initial evaluation of the potential of the pathway to allow the entry and spread of potential regulated pests in the PWRA area

2.1.1.1 Pathway Mapping (i.e., description)

To ensure that risk is being assessed for all the elements of the pathway, and that information used in the assessment is relevant to the pathway in question each pathway should be clearly described to the level of specificity required for the analysis. The beginning and end points of the pathway should be described as well as the transit route. All physical, geographical, ecological, seasonal, etc. characteristics relevant to potential pest entry and spread should be defined. Critical control points along the pathway where phytosanitary measures are or could be applied or pest status of the consignment monitored should be identified (United States Food and Drug Administration, 1997). Any commodities, conveyances, packing materials and handling/treatment protocols involved in the pathway should be considered in the PWRA. For the sake of simplicity it may be useful to present the pathway map as a flow diagram (though a detailed pathway description is a useful alternative).

2.1.1.2 Potential for the Pathway to Transport a Pest

Evidence should be sought to determine whether or not the pathway could become a means for the entry or spread of a pest or pests. The pest or pests of concern for each pathway should be listed. A check should also be made as to whether PWRAs or PRAs have been completed for all or some of the pathway(s) and associated pest(s). Pests for which no previous PRA has been completed should be categorized according to ISPM No. 11 (section 2.1) to determine if there is at least one potential regulated pest associated with the pathway.

The magnitude of the pathway should be considered in terms of frequency and volume as well as contact with a significant number and variety of pests. For the time in transit, the survivability of pests in relation to ecological/climatic conditions, as well as opportunities for contamination and cross-contamination, should be taken into account. If there is only a single pest of concern for the PWRA, or several specified pests, the potential for the pathway to transport a pest need only be considered in relation to those pests.

2.1.2 Conclusion of Pathway Categorization

If it has been determined that a pathway has the potential to serve as a means for the entry or spread of at least one potential regulated pest, the risk assessment of that pathway should continue. If a pathway does not fulfill this criterion, the risk assessment

process for that pathway may stop. In the absence of sufficient information, the uncertainties should be identified and the assessment process should continue.

2.2 Assessment of Pathway(s)

Each pathway is assessed for its potential to serve as a means for the entry and spread of pests. The individual pathway maps developed in section 2.1.1.1 should be consulted throughout this procedure, so that all elements of each pathway are considered in the assessment. The assessment should include consideration of risk-based mitigation measures including those currently in place. Factors that may be considered include (but are not restricted to):

Pathway Magnitude

- Diversity of regulated pests transported
- Number of individuals per species transported
- Minimum propagule size per species known to form viable populations
- Frequency of known entry of pests
- Frequency of transit
- Size/volume of incoming material
- Number of potential entry points along pathway
- Release potential due to catastrophic events (accidents)

Pathway Factors Affecting Survivability of Pests

- Speed/duration of pathway
- Potential for maintaining pest viability in transit or storage (consider conditions during harvest, processing, transloading, commercial procedures applied prior to or during transit such as refrigeration, sealed packaging)
- In-transit contamination such as co-mingling of shipments
- Suitability of season for survival of organisms

Detection of Pests Along Pathway

- Ease of inspection
- Ease of detection of pests
- Required inspection expertise
- Required diagnostic expertise
- Degree of detection resources required
- Likelihood of intentional concealment of a commodity due to illegal activity associated with the pathway (i.e. smuggling)

Environmental Suitability

- Proximity of entry, transit and destination points to hospitable environments for establishment (i.e. suitable climate, hosts, habitats)
- Shape and extension of the suitable areas crossed by the pathway
- Proximity to areas of low pest prevalence or pest free areas

- Potential introduction of generalist organisms (i.e. organisms with little environmental specificity)
- Intended use of commodity

Risk Management Considerations

- Past history of introduction of pests via pathway
- Potential to introduce new pests not yet in the PWRA area
- Potential to transport difficult-to-control organisms or organisms for which control options are not available/unknown or organisms for which control options are very expensive
- Management History (Successes and Failures)
- Analysis of applying multiple management methods to achieve greater risk reduction to all associated pathways or the increased risk independently applied to the several associated pathways being considered
- Management method cost analysis
- Intended Commodity Use

Consequences of Introduction

- Potential to transport organisms that are known to cause direct economic impacts (e.g. agriculture, forestry, horticulture, natural areas, property values etc.)
- Potential to transport organisms that are known to cause indirect economic impacts to domestic and international trade (e.g. pest infestations that result in export markets refusing products, etc.)
- Potential to transport organisms now or in the future that are known to cause impacts to natural resources (ecosystems, habitats, native plants, etc.)
- Potential to transport invasive organisms now or in the future that are known to have political or public sensitivity (e.g. sensational, unusual or unknown organisms or those known to impact endangered species?)

2.2.1 Scoring

The elements of the individual pathways assessments may be scored qualitatively or quantitatively. Generally, numerical scores will facilitate the relative ranking of pathways (section 2.4).

For determining the overall risk for each pathway, the risk factors scored above are combined to determine the probability of introduction of a pest or pests. An example of a quantitative scoring method for this section is provided in Appendix 2.

2.2.2 Estimation of Degree of Uncertainty

Estimation of the probability of a pathway to allow entry or spread of a pest involves many uncertainties. It is important to document the areas of uncertainty and, where appropriate, the degree of uncertainty for each element in the assessment.

2.2.3 Conclusion of Pathway Assessments

At the end of section 2.2, each pathway has been assigned a qualitative or quantitative score for both risk and uncertainty.

2.3 Assessment of Pests Associated with the Pathways

If warranted, pests identified in **Stage 1** may be subject to pest risk assessment as described in ISPM No. 11. Depending on the nature of the PWRA, for multiple pest pathways it may be possible to identify one or more representative pest(s) per pathway, and restrict the pest risk assessments to those pests.

Each assessment should include consideration of risk-based mitigation measures such as existing management options. If risk management practices with acceptable efficacy are already in place for a pest or pests associated with the pathway, the level of risk assigned for probability of introduction and spread will be lower for those pathways compared to pathways where fewer or less effective mitigation measures are in place. Acceptable efficacy should be determined considering technical aspects (e.g. fumigation) and bureaucratic factors influencing the application of the technique.

2.3.1 Single Pest Pathway Risk Assessment

If only one pest is being considered for the PWRA, a separate pest risk assessment should be conducted for the pest relative to each of the pathways with which it is associated. The same pest will therefore be evaluated multiple times, resulting in different outcomes for each associated pathway since the probability of introduction and spread may vary considerably for different pathways. It is important to document areas of uncertainty and the degree of uncertainty in each assessment.

2.3.2 Multiple Pest Pathway Risk Assessment

Separate pest risk assessments should be conducted for each pest-pathway combination. In other words, for each pest of concern, the elements of the pest risk assessment should be evaluated with respect to each pathway on which it may be transported. It is important to document areas of uncertainty and the degree of uncertainty in each assessment.

2.3.3 Conclusion of Pest Risk Assessments

At the end of section 2.3, a pest risk assessment has been completed for one or more pests associated with each pathway under consideration. For each pest risk assessment, an overall risk score should be assigned which encompasses both likelihood and consequences of introduction. The score may be qualitative or quantitative. Quantitative scores will facilitate pathway ranking in section 2.4. For a single pest pathway risk assessment there is only one risk score value and one uncertainty score value per pathway. For a multiple pest pathway risk assessment, the scores for all the pests in each pathway may be combined to obtain a cumulative or overall value of pest risk for each pathway. The same is done to obtain a cumulative value of uncertainty for each pathway.

2.4 Pathway Ranking

Ranking of each pathway is based on a combination of the risk scores obtained from the assessments of the pathways in section 2.2 and of the pests in section 2.3. For single pest pathways, the rank will be based solely on section 2.3. The risk values take into account existing management options.

This establishment of relative rankings will provide supporting rationale when an NPPO makes policy decisions regarding the prioritization of pathways that present the highest risk for their area. For a multiple pest PWRA, it may be necessary at this step for the NPPO to consider the significance of the risk posed by several lower risk pests on one pathway as compared to that of one or a lower number of higher risk pests on another pathway.

3. Risk Management

Pathway risk management is the process of identifying ways to react to the perceived risks associated with a pathway, evaluating the anticipated efficacy of these actions, and choosing the most appropriate options. The conclusions from pathway risk assessment (**Stage 2**) are used to aid decisions.

When prioritizing pathways, the risk ranking from **Stage 2** is considered along with additional risk modifiers or externalities that are identified in the risk management stage. This process may be quantitative or qualitative. Since zero-risk is not a reasonable option, the guiding principle for risk management should be to achieve the appropriate level of protection that can be justified and is feasible within the limits of available options and resources.

3.1 Identification and Evaluation of Risk Management Options

Pathways may be analyzed to identify critical control points from origin through to destination, where 'specific procedures can be applied to achieve a defined effect and can be measured, monitored, controlled and corrected' [ISPM No. 14, *The Use of Integrated Measures in a Systems Approach for Pest Risk Management*]. ISPM No. 11 outlines the various management options that may be considered when addressing phytosanitary risks. Appropriate measures should be evaluated based on their effectiveness in reducing the probability of entry and spread of pests.

The phytosanitary measures chosen should, where possible, effectively mitigate the entry and spread of a wide range of pests (both known and unknown) that may be transported via the pathway. At the same time, the measures should be specific for (or tailored to) consignment type (hosts, parts of plants) and origin so that they do not restrict the import of products where such measures are not justified. This would constitute a barrier to trade. Combinations of measures may be needed in order to achieve the appropriate level of protection.

The principles of necessity, minimal impact, transparency, equivalence, risk analysis, managed risk and non-discrimination set out in ISPM No. 1, *Phytosanitary Principles for*

the Protection of Plants and the Application of Phytosanitary Measures in International Trade are applicable.

3.2 Pathway Prioritization

It may be appropriate to consider risk ranking modifiers (external factors) which were not part of the risk assessment (**Stage 2**) but that will play a role in risk management. External factors could include: availability of resources that affect implementation of risk mitigation measures, feasibility and cost-effectiveness of mitigation measures, government priorities, the acceptable level of risk, indirect effects on trade, and political considerations such as consultations with trading partners. In this stage, risk managers may compile and evaluate a list of external factors for each pathway.

Pathways are then prioritized in order from high to low based on a combination of the pathway ranking from **Stage 2** and the external factors. As such, pathways are ranked three times: (a) **Stage 2** for the pest risk associated to the pathway based on scientific knowledge; (b) **Stage 3.1** to attach the management options that may lower risk level; and; (c) **Stage 3**, after incorporating external factors which are not related to risk management, but are political, economical or other types of influences not related to the pests and their management.

3.3 Selection and Application of Risk Management Options

Because of available resources, it may only be feasible to effectively manage the highest priority pathway. The PWRA results offer a justification and serves as an aid to decision-making about where to apply limited resources in order to effectively manage the phytosanitary risks associated with those pathways that present the highest level of unacceptable risk.

3.4 Conclusion of Pathway Risk Management

The result of the pathway risk management procedure will be the selection of management options for the highest priority pathway(s) or for all potential pathways if resources are available. These management options form the basis of phytosanitary measures, with the aim of lowering the risk associated with the pathway(s) to an acceptable level. The application and maintenance of such regulations is subject to certain obligations such as in the case of contracting parties to the IPPC.

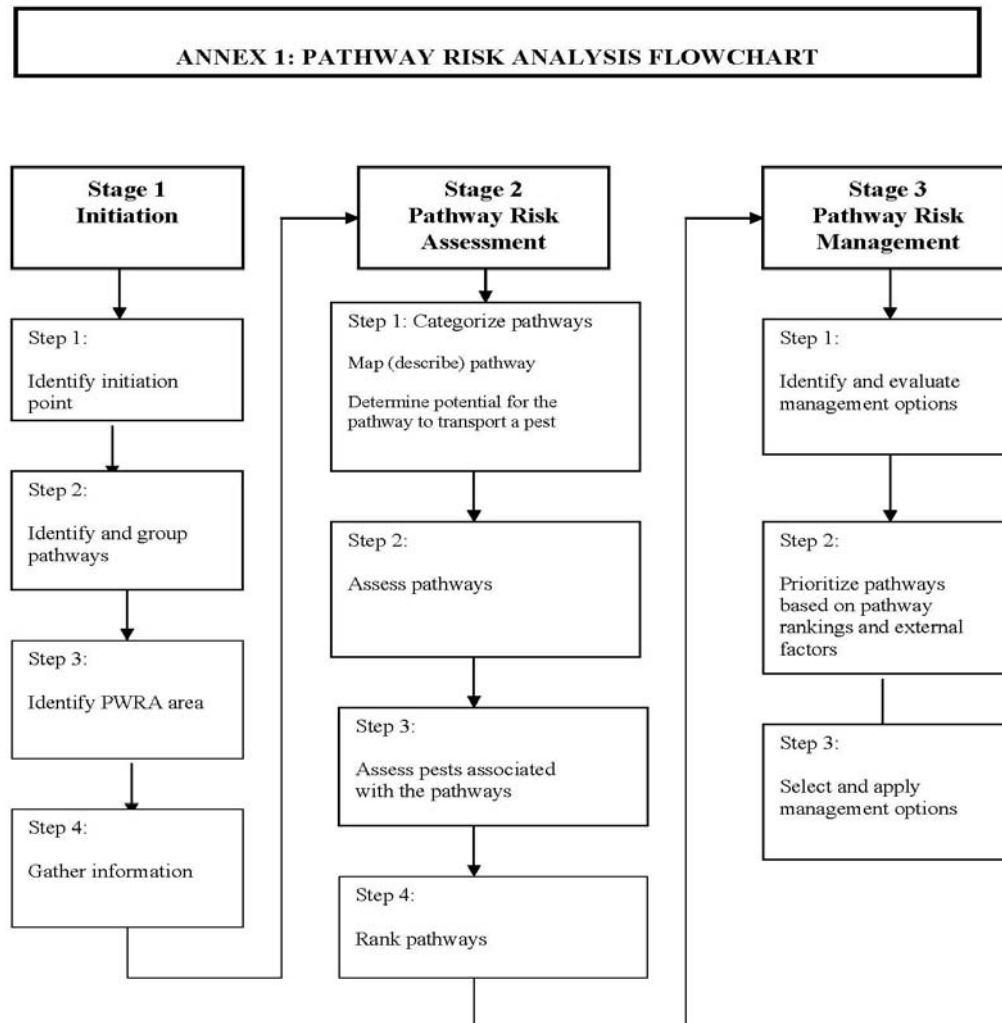
4. Documentation of Pathway Risk Analysis

4.1 Documentation Requirements

The IPPC and the principle of "transparency" (ISPM No. 1) require that countries should, on request, make available the rationale for phytosanitary requirements, restrictions and prohibitions. The whole process from initiation to pathway risk management should be sufficiently documented so that when a review or a dispute arises, the sources of information and rationale used in reaching the management decision can be clearly demonstrated. Other aspects of documentation are discussed in ISPM 11. The main elements of documentation are:

- purpose for the PWRA
- PWRA area
- sources of information
- description of each pathway that could include a map or flowchart outlining origin and end points, pathway route(s), list of known and potential pests associated with the pathway(s), control points, phytosanitary risk mitigation measures currently in place, etc.
- conclusions of risk assessments for pathways and associated pests
- risk ranking for each pathway
- risk management options identified
- risk ranking modifiers for each pathway
- pathway priority list
- pathway(s) selected for risk mitigation
- risk mitigation option(s) selected

Annex 1: Pathway Risk Analysis Flowchart



Appendix 1: Examples of Pathway Diagrams

OVERVIEW OF DIAGRAMS

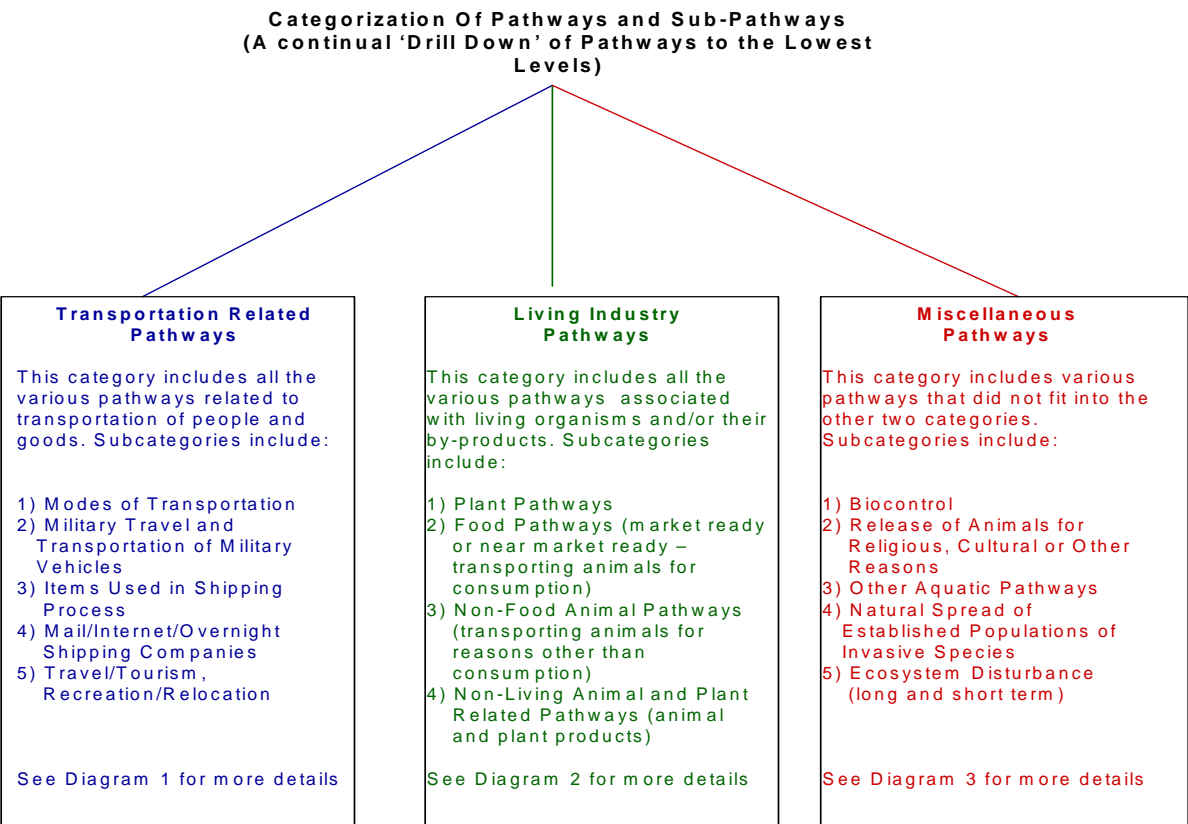


Diagram 1

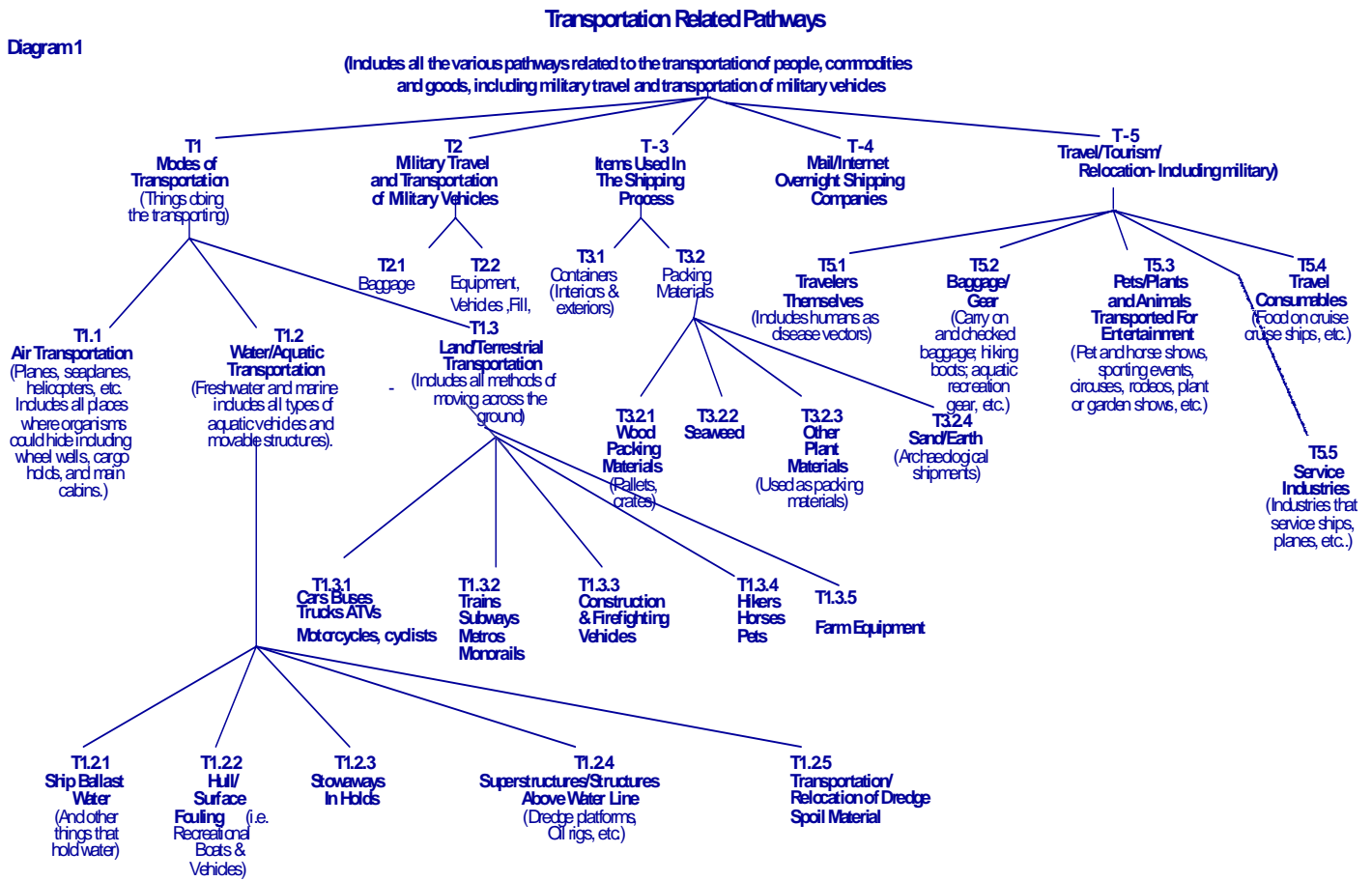


Diagram2

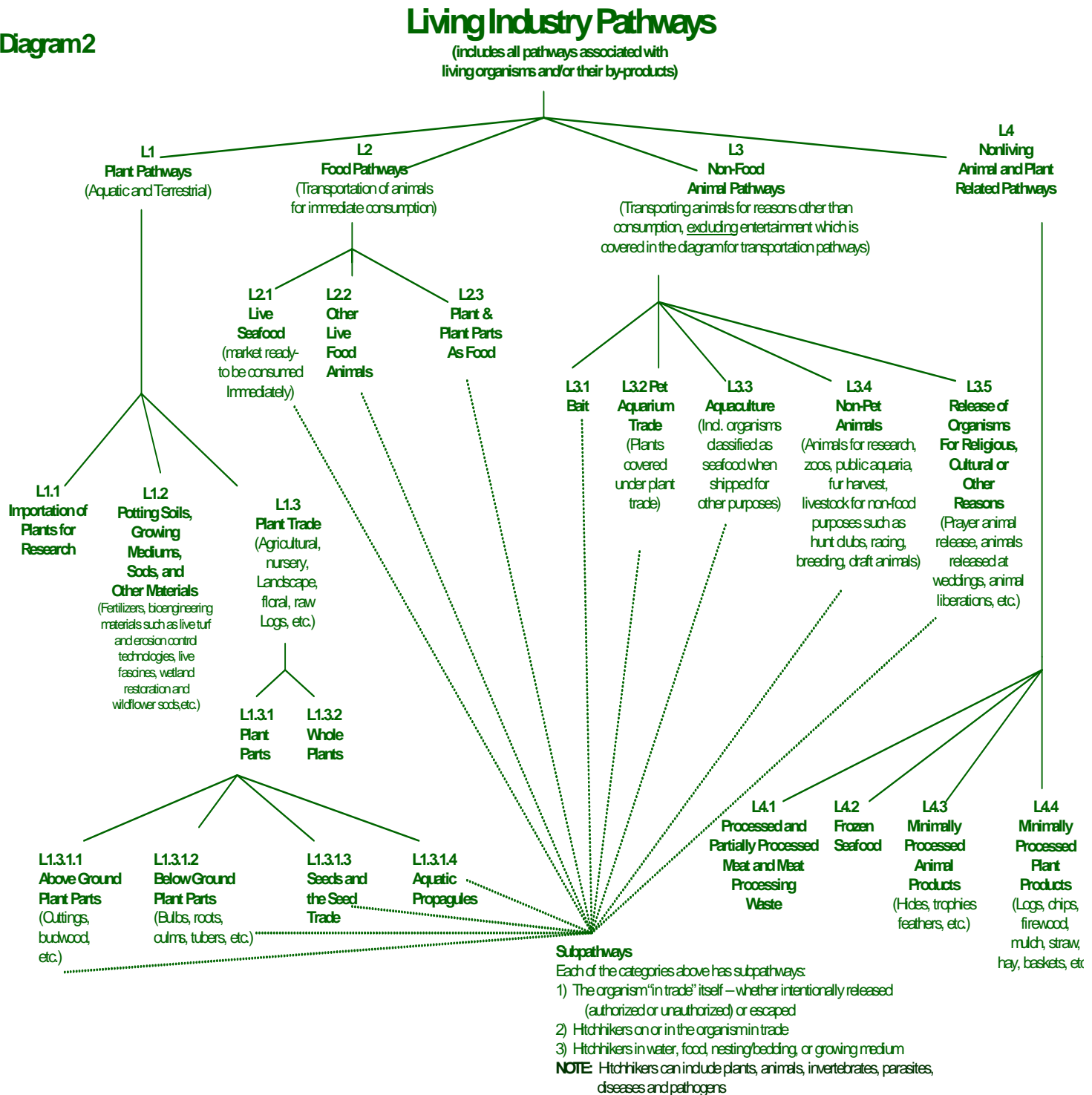
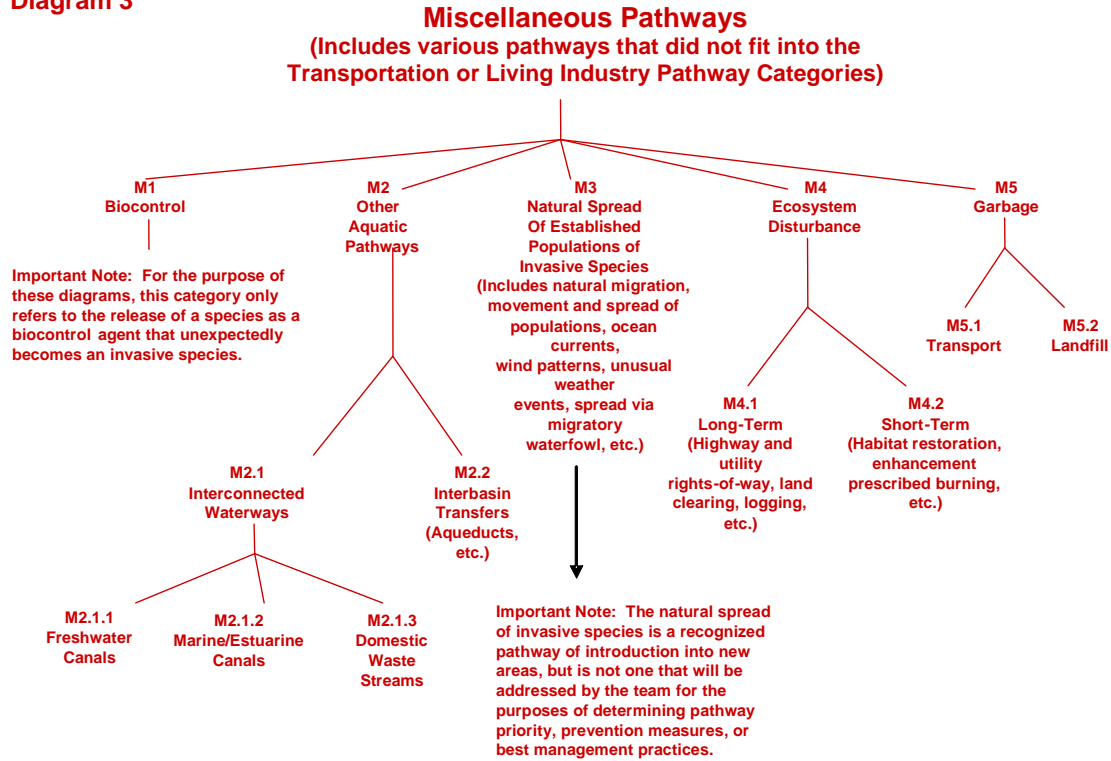


Diagram 3



This appendix is not an official part of the standard. It is provided for information only

Pathways List - Pathways Lists and Sub-Pathways (Color-Coded to Match Prior Charts)

(T) Transportation

T 1 Modes of Transportation

T1.1 Air

T1.2 Water/Aquatic

T1.2.1 Ship Ballast Water

T1.2.2 Hull/Surface Fouling

(i.e., Recreational Boats and Vessels)

T1.2.3 Stowaways in Holds

T1.2.4 Superstructures/Structures

Above Water Line

T1.2.5 Transportation/Relocation of

Dredge Spoil Material

T1.3 Land Terrestrial

T1.3.1 Cars, Buses, Trucks, ATVs.

Trailers for recreational boats

T1.3.2 Trains, Subways, Metros, Monorails

T1.3.3 Construction/Firefighting Vehicles

T1.3.4 Hikers, Horses Pets

T2 Military Travel and Transportation of Military Vehicles

T2.1 Baggage/Gear

T2.2 Equipment

T3 Items used in the Shipping Process

T3.1 Containers

T3.2 Packing Materials

T3.2.1 Wood Packing Materials

T3.2.2 Seaweed

T3.2.3 Other Plant Materials

T3.2.4 Sand/Earth

T4 Mail/Internet Overnight shipping

T5 Travel Tourism/Relocation

T5.1 Travelers Themselves

T5.2 Baggage/Gear

T5.3 Pets/Plants and Animals Transported
for Entertainment

T5.4 Travel Consumables

T5.5 Service Industries

(L) Living Industry

L1 Plant Pathways

L1.1 Importation of Plants for Research

L1.2 Potting Soils, Growing Mediums, Sods and Other Materials

L1.3 Plant Trade (agricultural nursery, landscape, floral, raw logs)

L1.3.1 Plant Parts

L1.3.1.1 Above-Ground Plant Parts

L1.3.1.2 Below Ground Plant Parts

L1.3.1.3 Seeds and the Seed Trade

L1.3.1.4 Aquatic Propagules

L1.3.2 Whole Plants

L2 Food Pathways

L2.1 Live Seafood

L2.2 Other Live Food Animals

L2.3 Plants and Plant Parts as Food

L3 Non-Food Animal Pathways

L3.1 Bait

L3.2 Pet/Aquarium Trade

L3.3 Aquaculture

L3.4 Non-Pet Animals

- L3.5 Release of Organisms for Religious,
Cultural or Other Reasons
- L4 Nonliving Animal and Plant Related Pathways
 - L4.1 Processed and Partially Processed
Meat and Meat Processing Waste
 - L4.2 Frozen Seafood
 - L4.3 Minimally Processed Animal Products
 - L4.4 Minimally Processed Plant Products

(M) Miscellaneous

M1 Biocontrol

M2 Other Aquatic Pathways

M2.1 Interconnected Waterways

M2.1.1 Freshwater Canals

M2.1.2 Marine/Estuarine Canals

M2.1.3 Domestic Waste Streams

M2.2 Interbasin Transfers

M3 Natural Spread of Established Populations

M4 Ecosystem Disturbance

M4.1 Long-Term (highway and utility rights-of-way,
clearing, logging)

M4.2 Short Term (habitat restoration,
enhancement, prescribed burning)

M5 Garbage

M5.1 Garbage Transport

M5.2 Garbage Landfill

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Appendix 2: Example of scoring system for section 2.2.1

If an NPPO chooses to assess pathways quantitatively, the calculations may be done using the following formulas:

Exposure or fate of the commodity or other entity in the environment = (intended use) x (ease of inspection of the commodity or entity factors) x (management/control factors) x (pathway magnitude factors) x (contamination factors).

Probability of entry or spread of a pest or pests via the pathway = (ease of inspection for the pest factors) x (ease of detection factors) x (magnitude factors) x (survivability factors) x (environmental factors).

Consequences of entry or spread of a pest or pests via the pathway = (Economic consequences factors) + (Environmental consequences factors).

Pest risk via a pathway = (Probability of entry or spread a pest or pests) x (Consequences of entry or spread of a pest or pests).

Pathway risk = (Exposure or fate of the commodity or other entity in the environment) x (Pest risk via a pathway).

ⁱ The likelihood is that the pest will 1) enter the pathway; 2) survive the pathway; 3) exit the pathway; 4) survive in a novel environment and 5) spread in the novel environment. The consequences are negative environmental, economic, or social/political effects from the pests.

ⁱⁱ Another example of grouping pathways, for which broad groups are characterized according to the degree of human intervention attributable to pathways, may be found in Hulme *et al.* (2008). These groupings may be considered in ranking and prioritization.